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ABSTRACT

It is a common public perception that schools are failing to perform their fundamental mission; in the public eye, the responsibility for this failure lies with the administrators leading the schools. Consequently, there has been a litany of criticisms of the programs that prepare administrators, particularly programs located in major research universities. This document presents a detailed analysis of: (1) the specific criticisms directed at administrators; (2) the attitudes, knowledge, and skills required to meet these criticisms; and (3) the instructional strategies, principles, and structures most likely to produce them. Problem-Centered Instruction (PCI) provides an alternative approach to administrator selection and training that focuses on the collaborative solution to practical field problems. Key concepts of this instructional method include recruiting students in a cohort group that will proceed though training as a unit; focusing instruction in each subject area on the implications of that content for the thematic problem; and using computer conferencing for continuing collaborative problem-solving, for class discussions of substantive issues, and for written class assignments. In April 1989, the University of Michigan field tested an educational administrator training program based on the PCI approach; currently, a cohort group of 19 has been admitted into the experimental program. (79 references) (KM)

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IMPROVING FACULTY AND DISSERTATION RESEARCH THROUGH PROBLEM-CENTERED INSTRUCTION

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A paper peresented at the annual meeting of the
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TABLE OF CONTENTS

Topic Discussed	Page
1.0 Problem	1
2.0 Need to Improve Educational Administration	1
3.0 Weaknesses in Current Training Programs.	2
4.0 Past Attempts to Correct Training Weaknesses	3
4.1 Improved Administrator Training.	3
4.2 Assessment for Improved Administrator Selection.	4
4.3 Using Assessment in Training.	5
4.4 Potential of Computerized Assessment.	6
5.0 Problem Solving: A Critical Administration Skill	7
5.1 Are Effective Principals Problem Solvers?	7
5.1.1 The Principal Profile.	8
5.1.2 Verification of the Profile.	9
5.2 Theoretical Support for Principals as Problem-Solvers.	11
5.2.1 Information Processing Model of Problem-Solving.	11
5.2.2 Principal Profile vs. Information Processing Model.	12
5.2.3 Summary and Critique: Information Processing Model.	14
5.3 Problem Solving Processes of Effective vs. Less Effective Principals.	14
5.3.1 Summary and Critique: Problem-Solving Comparison.	15
5.4 A Rational Model for Solving Management Problems.	15
5.4.1 Problem Analysis.	16
5.4.2 Decision Analysis.	18
5.4.3 Potential Problem Analysis.	19
5.4.4 Situation Appraisal.	20
5.4.5 Summary and Critique.	20

Topic Discussed	Page
6.0 Training Reforms Suggested by the National Commission.	22
6.1 Focus on Site Management.	23
6.2 Recommended Program Content.	23
7.0 Barriers To Reform.	24
7.1 Problem-Solving Is Not Viewed As Legitimate Research.	25
7.2 Skills Taught In Class Are Not Applied In Practice.	26
7.2.1 Skill Transfer From LOGO Use.	26
7.2.2 Theoretical Explanation of Failure to Transfer.	26
7.2.3 Implications of Transfer Research.	28
7.3 Appropriate Field Problems Are Not Available For Skill Practice.	28
7.3.1 Bringing Problems to Class: Case Studies and Simulations.	28
7.3.2 Optimal Use of Simulations.	28
7.4 Trend to Part-Time Students..	29
7.4.1 Possible Advantages of Part-Time.	29
8.0 A Proposed Solution: Problem-Centered Instruction (PCI)	30
9.0 An Experimental PCI Program for the Ed. D. in Educational Administration	30
9.1 Overview of Program Characteristics.	31
9.1.1 Trains Professional Practitioners.	31
9.1.2 Part-Time Students.	31
9.1.3 Cohort Grouping.	31
9.1.4 Problem-Centered Instruction.	31
9.1.5 Thematic Group Problem.	31
9.1.6 Specific Individual Problems.	32
9.1.7 School Improvement Liaison.	32
9.1.8 Use of Computer Simulations.	32

Topic Discussed	Page
9.1.9 Built-In Dissertations.	33
9.1.10 Blocked Courses.	34
9.1.11 Curriculum.	34
9.1.12 Teaching process.	35
10.0 Faculty Grounded Research on the PCI Program	35
10.1 Impact of Parens Patria Laws on Schools.	35
10.2 Effects of Using a Problem-Solving Protocol.	36
10.3 Developing New Research Projects.	37
BIBLIOGRAPHY	38

1.0 Problem

The common public perception that schools are failing to perform their fundamental mission has produced a litany of criticisms of the administrators responsible for leading the schools and the programs and institutions responsible for administrator training. Among the most virulent critics are the non-education faculty of major research universities. Can we design an educational administration training program for a major research university that avoids the weaknesses identified by critics of existing programs from the university, the profession, and the general public? This paper analyzes the problem and reviews relevant literature to identify the knowledge and skill required for effective educational administration in an age of school reform and the instructional strategies, principles, and structures most likely to produce them. The paper then concludes with a detailed description of an experimental program that incorporates these characteristics in an integrated research/problem-solving/training experience designed to promote optimal development of the knowledge and skill required for administrative competence.

2.0 Need to Improve Educational Administration

Improvement of administrator skills has recently been given high priority by federal and state governments, professional administrator organizations, and education agencies at all levels. Although the development of these skills is not a new interest, it has been given new urgency both by the recent national concern with the quality of American education and by the research finding that effective administration (management and leadership) is the major determinant of school quality (Walberg, 1986). The general concern with educational administration has led to an increasing amount of dissatisfaction with the way administrators are trained, selected and licensed. Federal concern is illustrated by the 1986 funding of the Leadership Development (LEAD) Act intended to create, in each state, a technical support center to develop and disseminate good management practice. In addition, a national center for research in educational leadership was funded in fiscal 1988. The concern of professional organizations is illustrated by the fact that the National Association of Secondary School Principals (NASSP) has developed an intensive two-day assessment procedure dedicated to the selection of competent principals, and now has assessment centers operating in all 50 states. Similar concerns in the State of Michigan have resulted in the adoption of mandatory certification of administrators (effective in 1988) and prompted the State Department of Education (DOE) to provide financial support to the Michigan Institute for Educational Management (MIEM) to run an NASSP Assessment Center and to provide in-service training in management and leadership skills. MIEM is a cooperative project of the state DOE and five professional organizations: the Michigan Association of School Administrators (MASA), the Michigan Association of Secondary School Principals (MASSP), the Michigan

Elementary and Middle School Principals Association (MEMSPA), the Michigan Association of Community Adult Educators (MACAE), and the Michigan School Business Officials (MSBO).

3.0 Weaknesses in Current Training Programs.

There is widespread dissatisfaction with the existing programs in educational administration by both the university and practicing administrators. The university complains about the low volume and quality of scholarship and research; for example, Miskel (1989, p. 11) cites research indicating that "Even today, educational administration faculty, in comparison to other faculty members, still devote a relatively small proportion of time to research ...", and that "professors lacked familiarity with both theoretical and empirical literature in educational administration and in related fields ... " Practitioners complain that their training did not provide them with the skills essential for their work, that faculty research and required dissertation research are not relevant; as a group, educational administrators disparage the utility of university training for preparing to face the problems of practitioners (Ourth, 1979, as quoted by Griffiths, 1988, p. 4). The responsibility of universities for this situation is illustrated by Griffiths (1988) with the following quotation from Achilles (1984, p. 131). The italicized phrase was added to clarify intent

> Higher education is far from blameless in this growing leadership problem. Many prestigious preparation departments focus most of their energies on preparing researchers and professors for higher education. They expend much effort on the doctoral programs. Few higher education institutions work diligently at developing exemplary principal/supervisor preparation programs. (Interestingly, this is the largest client group available to the universities!) Many seem satisfied with offering a whirlwind of courses that self-selected would-be-administrators can use to meet certification requirements, with little attention to prerequisites and sequencing. There are few full-time programs and scholarships or assistantships to help master's-level students enjoy the benefits of full-time study at the prestigious schools. Yet these institutions should concentrate on preparing people for the key positions of principal and supervisor, lest we have in administration the same problem identified by Sykes of the *(key positions monopolized by)* less able individuals graduating from the less prestigious schools.

But practitioners are also culpable. As Griffiths (1988) points out, the task of administrators is to make bureaucracies work. Superintendents and principals have not been reticent in assuming credit for schools which have been successful, he says, therefore they must take the blame when they are not successful. And there is general agreement that they are failing. The litany of public complaints is graphically illustrated by another quotation from Griffiths (1988, pp. 2-3):

> And what is the condition of American public education for which administrators are to be held responsible? While in a quantitative sense (number of years of schooling per child) American schools are very successful, and while there are exceptions to all generalizations, Finn's conclusion that "nearly everyone remains dissatisfied with the quality of our educational performance" (Finn, 1987, p. 63) is an accurate assessment of public

education. Discontent is expressed across the board: businessmen, military officers, and college professors, all of whose opinions are reinforced by declining test scores and indicators of quality such as those used by the National Assessment of Educational Progress (NAEP). There is a lack of productivity in spite of the fact that, as Finn (1987) points out, " between the early 1950's and the mid 1980's, per-pupil expenditures in American public schools tripled in constant dollars. Yet . . . there was no gain in what the average student learned, and in many areas, knowledge and skills deteriorated" (p. 64).

It should be clear from the above that there is a crises in education, and that a major contributing factor is a severe shortage of competent leaders at the district and building level

4.0 Past Attempts to Correct Training Weaknesses

In this discussion, past attempts to improve administrator performance are categorized as either training or assessment programs. Training programs emphasize the development or improvement of (existing) administrator knowledge and skill, while assessment programs emphasize the identification and selection of persons who have attained sufficient mastery of a pre-defined set of skills to be competent administrators. In both categories only recent innovative programs with direct relevance to the problem will be reviewed. Programs that combine these two approaches are reviewed in a subsequent section.

4.1 Improved Administrator Training. I begin with the assumption that educational administration programs cannot continue to exist in major research universities unless they develop a coherent and productive research base. Consequently, this section will deal with programs that perform their research and training functions in mutually beneficial ways.

A comprehensive review of the relationship between research and preparation is presented by Miskel(1989). After tracing the historical development of educational administration research from the "blind empiricism and atheoretical counting" of its early years through the theory movement (1954 to 1974), Miskel (p. 2) depicts the guidelines for preparing educational administrators developed by the American Association of School Administrators (Hoyle, 1985, 1987) as representing the "current thrust" of in training. The guideline present a "compentency-based model . . . in the social-science tradition. The outcome goal is that school leaders must conduct and use research as a basis of problem-solving and planning of all kinds. The (required) competencies include gathering and analyzing data; understanding descriptive and inferential statistics; using evaluation and planning models and methods; and selecting, administering and interpreting evaluation instruments."

Miskel was able to locate three programs that "made research an integral and powerful part of preparation": the Center for Advancing Principalship Excellence (APEX) at the University of Illinois (Silver, 1987), the Peer Assisted Leadership (PAL) program at the Far West Laboratory

(Barnett, 1987), and the Principals' Institute (PI) at Vanderbilt University (Peterson, 1987). All three were in-service programs that "required practitioners to collect and analyze data and contrast the results with existing theory and practice".

Some innovative "action-research" or "collaborative problem-solving" programs have also occurred in in-service programs for principals, but not in pre-service programs. For example, the Maine Principal's Academy (Donaldson, 1987) currently sponsors a program in which principals come together and establish their own meeting topics for discussion and role-playing exercises which they assert "are far more valuable than course work." The Managing Productive Schools (MPS) program provides principals with thirty days of skill training over two years, focusing on group problem-solving about school challenges to ensure that transfer of learning to real school situations actually occurs (Snyder and Geila, 1987). The ambitious Northwest Regional Laboratory Program (Blum, Butler, and Olsen, 1987) begins with a year-long series of workshops designed to build knowledge and skills, then proceeds to an extended pairing of principals in the field who observe and coach one another during ensuing months.

4.2 Assessment for Improved Administrator Selection. General concern with the quality of educational administrators has stimulated the development of a variety of procedures for assessing the administrative knowledge and skill of persons being considered for administrative positions. The work of the National Association of Secondary School Principals (NASSP) is particularly relevant to this discussion. In 1978, NASSP funded a project to develop a comprehensive assessment procedure that could identify persons who had the knowledge and skill necessary to be competent building administrators at the high school level. The initial premise of the project was that valid assessments of ability could be made by observing the performance of aspiring administrators as they "solved" simulated problems analogous to those faced by real-life administrators. The result was the present-day NASSP Assessment Center. The following account is based on both written descriptions in the assessors' manual and the personal experience of the author, who is an accredited assessor.

Assessments must be performed in an accredited NASSP Assessment Center. Candidates for administrative positions are brought in groups of twelve to the Center to participate in a series of exercises that require them to deal with a variety of job-related problems in a simulated school environment. Six separate activities are presented to the candidates over a period of two full days. During the entire period, the candidates' problem-solving and decision-making behaviors are observed by six NASSP-trained assessors. Since even trained assessors will have different skill levels, and tend to focus on somewhat different aspects of performance, the effects of assessor differences are controlled in two ways. First, in each exercise, the behavior of each candidate is observed and recorded by two independent assessors. Second, assessors are assigned different

candidates in each of the six exercises so that all assessors observe each candidate once. In general, assessors are looking for behaviors which exhibit one or more of the following twelve generic skills: (1) problem analysis, (2) judgment, (3)organizational ability, (4) decisiveness, (5) leadership, (6) sensitivity, (7) stress tolerance, (8) oral communication, (9) written communication, (10) ranges of interests, (11) personal motivation, and (12) educational values.

When the two days of candidate observation are completed, the assessors spend another three very long days (typically between 12 to 15 hours) translating the recorded behaviors into a final report for each candidate candidate that provides consensus ratings of his or her ability with respect to each of the twelve generic skills. The consensus ratings are used to generate a written final report for each candidate.

Studies of the validity of NASSP Assessment procedures have demonstrated that: (a) there is substantial agreement among the assessors, (b) the assessment exercises were judged by a panel of experts to have high content validity, and (c) generic skill ratings were strongly correlated with the amount of previous administrative experience, with measures of (positive) school climate, and with subsequent on-the-job performance as rated by colleagues and supervisors. The conclusions of the validation studies have been supported by subsequent experience. There are now more than 40 NASSP Assessment Centers operating throughout the country serving schools in all 50 states. Districts which have used the procedure to select administrators are, by all reports, enthusiastic: there appears to be broad consensus that persons selected using assessment results generally perform better than those selected in the traditional manner.

4.3 Using Assessment in Training. In Michigan, the growing use of NASSP Assessment led to the 1986 establishment of the Michigan Academy of Principal Preparation (MAPP) to explore ways to use NASSP assessment concepts in training educational administrators. MAPP affiliates currently include the Michigan Department of Education and administrator training programs from The University of Michigan and six other universities: Central Michigan, Eastern Michigan, Northern Michigan, Oakland, Wayne State, and Western Michigan.

MAPP has now been accredited by NASSP as an Assessment Center, and plans to administer both pre- and post-training NASSP Assessments to at least twelve administration students at each participating institution during each of the next four years. There is little doubt that this is a positive step. Personal experience with the assessment procedure, plus anecdotal evidence from other assessors suggests that NASSP assessment will provide valuable diagnostic information to training programs. Most persons who take the trouble to become completely familiar with the assessment process are convinced that: (a) it provides important insights about a

candidate's administrative and leadership skills, and (b) these insights can not be obtained from traditional tests, interviews, or classroom observations.

Assessment experience also suggests the skill areas that most need to be strengthened. Throughout the country, a large proportion of assessees have been weak in the generic skills of problem analyses and judgment. There appears to be a pervasive assessee belief that they must act immediately, resulting in high decisiveness but yielding decisions of low quality. Training in these skill areas is obviously needed.

Despite the obvious need, however, the NASSP Assessment procedure is unlikely to be widely used in training programs because of two intrinsic disadvantages: (1) the requirement of two person- days of trained assessor time plus the two days of assessee time for each person assessed is too expensive, and (2) it is difficult to relate the abstract NASSP generic skills to the specific knowledge that is usually included in administration training curricula. However, it was my contention that it should be possible to computerize much of the assessment process, and that a computerized version would usable in regular classrooms. I proposed building a prototype of such a system with MAPP funds.

4.4 Potential of Computerized Assessment. The proposal to develop a prototype version of a computer-driven simulation labelled ADMIN-SIM (Administrative Decision-Making & Inquiry Simulation) was funded by the Michigan Academy of Principal Preparation MAPP in December, 1987. A prototype simulation consisting of two in-basket exercises (each comprised of seven decision items) and a computer program that administers the items and records all participant responses has now been developed. The relevant point for the present discussion is that the pilot project (Collet & Rinne, 1988) provided evidence that: (1) in-basket exercises can be satisfactorily be administered by computer, (2) the skills required by the computerized in-basket are comparable to those required by the NASSP assessment process, (3) records kept by ADMIN-SIM assist in assessment of performance, and (4) the ADMIN-SIM process can assist in teaching effective problem-solving procedures.

It is suggested that ADMIN-SIM simulated experience be used as a supplement to regular field internships rather than a substitute for them. In this pattern the simulated experience becomes a bridge between classroom learning and clinical practice. The disadvantages of using only field internship for skill practice are: (a) field variables cannot be manipulated, and (b) field problems covering the important skill areas cannot be presented in logical order, or even be guaranteed to occur. However, simulations of field problems are controllable and can be produced in the variety and numbers necessary to provide adequate practice. Even more important, the process of developing simulations is an ideal vehicle for teaching the higher-order inquiry skills that doctoral programs are intended to develop.

An additional advantage is that simulations can be designed to permit manipulation of variables substantively important to the problem-solving process (e.g., time constraints, interruptions, amount additional information available from various sources, proportion of information that is irrelevant, etc.), thus providing an important vehicle for theoretical research to faculty. This capacity is expected to not only motivate and facilitate faculty research, but to promote productive integration of research and instruction. Two of the prototype problems are designed with manipulable variables.

5.0 Problem Solving: A Critical Administration Skill

The accumulated scores from several thousand assessment centers demonstrates that large numbers of administrative aspirants have severe weaknesses in problem-solving skills. But is there any evidence that problem solving skill is related to successful administration? Why are these skills be important? How can they be improved?

5.1 Are Effective Principals Problem Solvers? In the early 1980's, the Ontario Institute for Studies in Education (OISE) launched a comprehensive program of research on improving principal effectiveness. The results of the first phase of that study were reported by Leithwood and Montgomery (1986). The purpose of phase one research was to answer three questions:

1. What aspects, categories, or dimensions of principal actions (behavior) have the most direct influence on school effectiveness?

2. Within such dimensions, what is the nature of highly effective principal action?

3. Are there discernable patterns of variations in principal actions that might be viewed as stages of growth towards highly effective behavior? If so, how can these stages be described?

The investigators began with a comprehensive review of the related literature (ibid., chapter 11). After reviewing some 72 studies, they concluded that the evidence is "relatively unambiguous" in support of the following characteristics of effective principal behavior:

1. Effective principals place highest priority on promoting student cognitive growth (usually basic skills) and happiness. Since research on teacher thinking is "almost unanimous" in suggesting the same goal is used by effective teachers in making curriculum decisions, this common priority is thought to create a bond between principal and teacher roles and provide a firm basis for shared decision making.

2. Effective principals value and foster good relations with teachers, central administration, parents, and the community <u>because</u> they positively affect student growth. Ineffective principals, on the other hand, tend to value good relations with these groups as an end rather than a means.

3. Effective principals value share decision making, and tend to work towards their goals by:
   (a) collaborating with teachers on a regular basis to design and evaluate classroom instruction,
   (b) assigning adequate resources and planning times for improvement efforts,
   (c) monitoring class progress, providing feedback on progress, and providing professional development resources as needed,
   (d) taking personal responsibility for defining priorities focused on the central school-wide mission, and for gaining support for these priorities from all stakeholders.

5.1.1 The Principal Profile. The review results provide a "somewhat incomplete" behavioral profile for effective principals, with little information about the corresponding profile for ineffective principals. The purpose of the original research conducted at OISE (ibid., chapter 12) was to make a direct and more detailed comparison of the specific behaviors which distinguish highly effective and moderately effective principals. The first step was to identify the critical dimensions of problem solving behavior. The data for this task came from verbal descriptions of job activities gathered during a series of extensive individual interviews with of 23 elementary and secondary principals from 4 districts in the Toronto area. Specific behaviors (actions) were then abstracted from the interview protocols, and grouped by a number of different criteria. After many iterations, the authors were able to sort the behaviors into four major dimensions which they labelled goals, factors, strategies, and decision making.

The second task was to develop comprehensive descriptions of highly effective behaviors in each of the four dimensions. This work extended over 30 months, during which the researchers met with the 20 staff members from a local school system for one-half day each month. The intent was to describe highly effective principal behavior by integrating the collective knowledge and experience of the group with the findings of extant research. To begin, the comprehensive literature review was read by the group, and its methods and conclusions debated -- including a variety of formal internal validity checks of the studies reviewed. Then , participants added behavior descriptions from their own experiences to the data pool, and participated in a collective clarification of concepts, categorization by dimension measured, and assessment of effectiveness of each new behavior and concept. The researchers characterize this data collection process as the functional equivalent of 20 sequential group interviews, each of three hours duration. The behaviors from the pool which were considered most effective were then used to generate exemplary descriptions of highly effective behaviors in each of the four profile dimensions. Next, protocol descriptions of ineffective (or at least much less effective) were generated by the same

process. Subsequently, two other common patterns of behavior were identified, and protocols describing them written. These were believed to represent intermediate levels of effectiveness.

The final product was a principal profile which identified four common patterns of behavior (profiles) representing growth principal effectiveness, each of which was given a mnemonic label based on the kind of behavior typical of that level. Listed in order of increasing effectiveness, the four archetypical profiles were labelled: (1) the administrator, (2) the humanitarian, (3) the program manager, and (4) the systematic problem solver. Leithwood and Montgomery (1986, chapters 3 to 6) dedicate an entire chapter to each level, and provide extensive descriptions of the specific behaviors typical of each dimension. Thus, one can obtain a holistic 1 to 4 rating of a client's overall effectiveness by matching his or her behavior patterns to those in the profile. A brief summary of the principal profile appears in figure 1 on page 10.

5.1.2 Verification of the Profile. After the principal profile was developed, four verification studies were conducted to assess the utility and validity of effectiveness ratings derived from it. In the first study profile ratings were compared with ratings with effectiveness ratings of independent judges. In the second study, profile ratings were compared to effectiveness ratings derived from the 72 item questionnaire (the Ventures in Excellence system). In the third study, the content validity of the profile was assessed by surveying experts who were given an extended opportunity to become familiar with the system. The fourth and final study assessed the construct validity of the profile by comparing profile ratings with the amount of growth in teachers' implementation of an new curriculum over the period of one year.

The fourth study failed to identify a systematic relationship between principal effectiveness as measured by the profile and growth in degree of implementation. This should not have been an unexpected result, given the number of potentially confounding variables (for example, how was the decision to implement made, and by whom?). However, using the convergence and triangulation techniques described by Brinberg & McGrath (1982), the authors were able to demonstrate "moderate" support for the Hypothesized hierarchical structure of the four effectiveness levels, and "incontestable" evidence that the behaviors in level 4 are indeed highly effective, and that those in level 1 indeed represent the lowest level of effectiveness. The evidence regarding the relative effectiveness of the two middle levels (the humanitarian and the program manager) was mixed. Consequently, it is the recommendation of this reviewer to assign a tied rating score of 2.5 for either of these levels when using the profile for effectiveness rating.

The authors' choice of the term "systematic problem solving" to designate highly effective behavior underlines and important difference between the behaviors in the profile and those suggested by the majority of administrative theories, which tend to view school administration as

	DIMENSIONS OF BEHAVIOR			
LEVEL	DECISION-MAKING	GOALS	FACTORS	STRATEGIES
4 (High) Systematic Problem Solver	-skilled in use of multiple forms; matches form to setting and works toward high levels of participation -decision processes oriented toward goals of education, based on information from personnel, professional, & research sources -anticipates, initiates, and monitors decision processes	-selected from multiple public sources -highly ambitious for all students -transformed into short term goals for planning -used to actively increase consistency among staff in directions they pursue	-attempts to influence all factors bearing on achievement -expectations within factors are specific -expectations derived from research and professional judgment	-uses a wide variety of strategies -criteria for choice include Goals, Factors, context, and perceived obstacles -makes extensive use of Factor-specific strategies to achieve goals
3 Program Manager	-skilled in use of several forms; selects form based on urgency and desire to involve staff -decision processes oriented toward school's program and based on information from personal and professional sources -anticipates most decisions and monitors decision process regularly	-selected from several sources, some of which are public -particular focus on exceptional students -encourages staff to use goals for planning -conveys goals when requested or as particular need arises	-attempts to influence factors bearing on the school program -expectations within factors are specific -expectations are derived from personal and staff experiences and occasionally from research	-relies on limited number of established, well tested strategies -choice based on student needs (especially special students); desire to be fair and consistent, concern to manage time -uses Factor-specific strategies which are derived largely from personal experience and system direction
2 Humanitarian	-uses primarily participatory forms of decision-making based on a strong motivation to involve staff so they will be happy -tends to be proactive concerning decisions affecting school climate but largely reactive in all other areas unless required to act	-derived from belief in the importance of interpersonal relations -goals may be ambitious but be limited in focus -goals not systematically used for planning -conveys goals to others if requested	-attempts to influence factors bearing on interpersonal relations -expectations within factors ambitious but vague -expectations are mostly derived from personal experiences and beliefs	-choose strategies which focus on interpersonal relationships -choice based on view of good school environment, view of own responsibilities, and desire to make jobs of staff easier -make little use of systematic Factor-specific strategies
1 (Low) Administrator	-uses primarily autocratic forms of decision-making -decision processes oriented toward smooth school admin. and based on personal sources of information -decision processes are reactive, inconsistent, and rarely monitored	-derived from personal needs -focus on school admin. rather than students -pursuit of instructional goals considered to be responsibility of staff not principal -conveys goals to others if requested	-attempts to influence factors bearing on school appearance and day-to-day operations (mostly nonclassroom factors) -expectations within factors are vague -expectations are derived from personal experiences	-chooses strategies based on personal need to maintain administrative control and remain uninvolved in classroom decisions -strategies mostly limited to use of vested autority and assisting staff with routine tasks -attends to Factor-specific strategies in a superficial way if requested to do so.

Figure 1. A summary of growth in principal effectiveness.

decision making (Greenfield, 1985), with a consequent emphasis on choosing among known alternatives by weighing them against the values, purposes, and expectations of stakeholder groups. In contrast, the principal profile data emphasized the creation of effective solutions. Solution creation requires the use of higher-level metacognitive processes (i.e, problen solving strategies): hence the designation of highly effective behavior as systematic problem solving.

5.2 Theoretical Support for Principals as Problem-Solvers. One goal of research with the principal profile was to develop a theory which explained school learning as a function of "alterable" variables; that is, variables that were likely to be responsive to intervention. By contrast, much of the previous research had concentrated on the effects variables such as personality traits, age, and leadership "style", which are largely unresponsive to intervention. Furthermore, theorists had been overly reductive, and too dependent on a priori explanations having little empirical support. As a result, Rutherford et al. (1983, page 22) could conclude that the implications of leadership theory were "not consistent from one authority to another, nor were they supported in a consistent manner by research findings. In fact, say Leithwood and Montgomery (1986, page 234), "The tenuous support for even such a widely promoted and scrutinized view of leadership as Fiedler's contingency theory is illustrated by Crehan's recent meta analysis. (See Fiedler (1967) and Crehan (1983).) The overall state of affairs was neatly summarized by Murphy, Hallinger, and Mitman (1983, page 298): "The most serious flaw in the area of educational leadership is the general lack of comprehensive models to explain research findings.

To avoid previous errors, the OISE researchers adopted a grounded theory approach. Having previously established that four dimensions of principal behavior (goals, factors, strategies, and decision making) discriminated between moderately and highly effective principals, they now set out to develop a theoretical explanation for the pre-eminence of these dimensions (Leithwood & Montgomery, 1986, chapter 7). Since the promotion of good problem solving behavior had emerged as a fundamental research goal, the researchers adopted as their basic model an information processing theory of behavior explicitly developed to explain problem solving behavior (Newell & Simon,1972) The model described here is consistent with contemporary views such as Norman and Lindsay (1977), Chalfee (1981), and Chi, Glaser, and Rees (1982).

5.2.1 Information Processing Model of Problem-Solving. Information processing theories of human functioning view all performances as goal oriented; consequently, most activities involve problem solving behavior intended to remove barriers to goal attainment. These activities are explained in terms of three mental structures: the executive, short term memory, and long term memory. The Executive (E) receives all incoming messages (stimulae) and determines their

relevance for achievement of short and long term goals (both of which are generally viewed as resident in E). Information judged to be irrelevant to goal achievement is ignored; relevant information is passed to Short Term Memory (STM) for processing.

STM has the capacity to compare and contrast, and to integrate new bits of information into existing knowledge structures, but it can only deal with a small number of information pieces at a time because storage space (memory) is quite limited. The main function of STM is to "make sense" of incoming information. It does this by searching through the virtually unlimited storage space of Long Term Memory (LTM) for clusters of related information. Two kinds of information clusters are stored in LTM: knowledge schema, and procedural schema.

Knowledge Schema. Knowledge schema are clusters of interrelated facts, concepts, principles, and "personal theories". At the simplest level, "sense" can be made of the new information by assimilating it into an existing schema. However, some pieces of information define relationships among existing schema: i.e., they are superordinate schema. Thus, schema eventually form a hierarchical network which is continually being reorganized as new information is added. Generally speaking, the larger and more sophisticated this hierarchical network becomes, the faster and more efficiently LTM can be searched, and the faster STM will be able to "make sense" of new information.

Procedural Schema. Procedural schema are structures which indicate how to act on a step by step basis. Since new information was originally perceived to be goal related, the "sense" made of it may frequently suggest a need for action (e.g., to remove a goal barrier). If this is so, STM will mount a search for an appropriate procedural schema. Note, however, that the use of a procedural schema involves the performance of the action steps as well as knowledge of them. Stringing a sequence of actions together in a smooth and effective performance requires skill, which can only be developed through practice. With practice, the individual actions of a performance become less and less conscious and more and more automatic. In general, high levels of skill are characterized by high levels of automaticity.

Executive Strategies. Like their knowledge counterparts, procedural schema can be organized hierarchically. Of particular interest for administrators are superordinate procedural schema called executive strategies that can be used to direct very large and complex activities. Executive strategies might be thought of as a multi-layered hierarchical organization of procedural schema. Because of their sophisticated organization of activities, executive strategies are enormously powerful aids to problem solving. Note, however, that high levels of skill in their use will require practice at each level of the hierarchy.

5.2.2 Principal Profile vs. Information Processing Model. Leithwood and Montgomery (1986, chapter 7) provide a detailed discussion of the correspondence between the information processing model and the findings of the principal profile research, concluding that the model fully

explained the four critical dimensions of the profile. More important, they also demonstrate that the model, coupled with supporting findings from research on problem solving, suggests the type of intervention (training) that might produce more effective principal behavior on each of the four critical dimensions. The implications most relevant for this study are listed below.

1. Goals. Principals' goals are enormously important because they both how they define their jobs and how they represent their problems. (Research indicates these are critical for effective problem solving.) The implication is that principals should be taught to:
   (a) identify, explain, and support the major "public" goals for children espoused by the agencies responsible for shaping the schooling enterprise.
   (b) work collaboratively with teachers, parents, and students to identify specific school goals which are focused on local needs but also consistent with public goals.
   (c) state all school goals in terms that clearly show their relationship to the instructional program.
   (d) explicate long term goals by identifying the sequence of short term, enabling goals prerequisite to its achievement.
   (e) relate all actions (decisions) to specific school and public goals.

2. Factors. The authors use the term factors to represent the environmental, demographic, and organizational variables typically studied in previous research. This kind of broad-based dependable (research-based) knowledge has always been considered important, and need not be defended here. However, the model would suggest the following shifts in emphasis.
   (a) There should be more emphasis on superordinate knowledge schema such as taxonomies, paradigms, and the like.

   (b) Since it has been demonstrated that a strong knowledge base promotes effective action, principals ought to be taught to use effective information searching strategies in all problem-solving and decision-making activities.

3. Strategies. The term strategies, as used in the principal profile research, is a procedural schema in information processing terms. Procedural schema may be either general purpose (e.g., the steps to follow to analyze a problem) or factor specific (e.g., the due process steps to follow in disciplining student misbehavior). Principals use a wide variety of both types. Procedural schema and executive strategies that would positively contribute to principal training are not explicitly suggested by the authors, but it is safe to infer that a general purpose problem-solving strategy of the sort envisioned by the ADMIN-SIM model would be given high priority.

   Interventions intended to improve principal performance will necessarily have to place strong emphasis on teaching effective procedural schema, and developing skill in their use. The major implication of both research and theory is that clinical practice is absolutely vital both for learning individual procedural schema, and for integrating them into an efficient and effective executive strategy. The realistic simulated problems planned for the ADMIN-SIM system should provide an ideal vehicle for teaching such strategies.

4. Decision Making. In terms of the information processing model, decision making as used in the principal profile is an executive strategy. The authors suggest that the decision making process should be characterized by (procedural schema) that:
   (a) define and clarify the purpose of the decision (i.e., the values and objectives it serves), and the context in which it is to be made.

(b) match the decision-making process to the specific purpose and context of the decision to be made. (In this respect, the authors believe that every principal should be taught to use a number of different decision-making models, and criteria for selecting among them. They do not, however, identify the particular models or selection criteria.)
(c) search for dependable (research based) information about the decision alternatives and the nature of the underlying problem they address whenever time permits.
(d) develop clear and explicit decision criteria, and ensure that they are used.

5.2.3 Summary and Critique: Information Processing Model. Although the authors' evidence for the utility of an information processing model was based entirely on post-hoc analyses, the fit to the data appeared to be quite remarkable. Of particular interest to this project is the concept of an executive strategy. In fact, the purpose of this project can accurately be stated as a search for an executive strategy that can be taught to principals to ensure effective and efficient problem solving behavior in their every day tasks. Efficiency will demand a high levels of skill in using the executive strategy; the development of such skill will not only require extensive practice in the individual procedures that comprise it, but also specific practice in stringing together subordinate schema. This will be necessary at each level of the hierarchy, including the executive strategy itself.

Such "hierarchical" practice has been a common procedure in sports, where students are routinely given extensive supervised practice in each discrete movement, and then in the performance of the sequence of movements. But in professional training programs, we have too often taught the sequence of steps in a strategy as an abstract concept, and then expected individual students not only to make the practical applications on their own, but also to obtain sufficient practice to develop skill in its use. Both the reported research and practical experience provide strong evidence that this automatic transfer simply does not occur. Whenever procedural schema are taught, instruction must be accompanied by well-designed clinical practice in amounts sufficient to ensure the skill is mastered.

5.3 Problem Solving Processes of Effective vs. Less Effective Principals. The pre-eminence of systematic problem solving among highly effective principals suggested that they might have become more effective because they had learned more powerful problem-solving strategies. In a follow-up study, Leithwood & Stager (1986) used the extensive database from the principal profile study to compare the problem solving processes of highly effective and moderately effective principals. The researchers identify a large number of process characteristics on which the two groups differ. Only those most germane to the proposed project are listed here. As compared to moderately effective principals, highly effective principals are more likely to:

1. use an explicit system for sorting and categorizing problems, and less likely to deal with problems on a one-by-one, ad hoc basis.
2. have a deliberate method for assigning priorities to problems.

3. award priority according to the impact on the overall program, and less likely to award priority according to who is involved.
4. have explicit strategies for managing time; thus, more time for problem solving.
5. recognize problem elements for which effective solution strategies exist, and also more likely to recognize new elements (those which are truly unique).
6. use a collaborative problem solving process, and to have in place organizational structures to support collaboration.
7. use a deliberate model or strategy for problem solving.
8. systematically seek, collect, and analyze information related to (all aspects of) a problem.
9. seek out numerous and diverse sources of information.
10. be able to articulate both their goals and the educational values from which they derive.
11. be aware of the educational goals and values of the board, community and state.
12. have confidence in the problem solving process and yet be realistic about the inevitability of making some mistakes.

5.3.1 Summary and Critique: Problem-Solving Comparison. The twelve characteristics of good problem solvers listed above appear to be entirely consistent with both the research and theory reviewed previously. Since there are no observable inconsistencies or contradictions, it would be desirable for the executive strategy developed for the proposed training system to contain mechanisms that inculcate (or at least encourage) each of the desirable behaviors.

Unfortunately, Leithwood *et al.* do not provide much guidance about how to teach good problem solving skills. However, theoretical ideas developed by authors in other fields have the potential of bridging this gap. Some of the most promising are the rational management concepts developed by Kepner and Tregoe.

5.4 A Rational Model for Solving Management Problems. In 1957 Charles Kepner and Benjamin Tregoe, who were working as social scientists at the RAND corporation, became intrigued by a number of incredibly bad decisions that had been made by large agencies of industry and government. When analysis revealed that most of these errors occurred because important pieces of available information had been ignored, the authors began to develop systematic procedures that managers could use to prevent such errors. The beginning efforts were so promising that the authors founded Kepner-Tregoe, Inc. to conduct training and research in what they labelled Rational Management. The current version of Rational Management is described in detail by Kepner and Tregoe (1981), along with validating evidence and illustrative applications from hundreds of case studies collected during twenty years of management consultation.

Kepner-Tregoe Rational Management consists of four systematic procedures intended to provide efficient and effective means of answering four general questions encountered by managers every day: (1) What is going on? (2) Why did this happen? (3) Which course of action should we take? (4) What lies ahead? The corresponding procedures are labelled: (1) situation appraisal, (2) problem analysis, (3) decision analysis, and (4) potential problem analysis. The four

procedures and the relationships among them are summarized in figure 2, page 17. As indicated by the arrows, the procedures are not independent entities, but components of a larger cyclic process in which Situation Appraisal can be thought of as both the end of the previous cycle and the beginning of the next one. For this reason, it is easier to begin with a description of the three analytic processes in the center of figure 2, then come back to Situation Appraisal.

5.4.1 Problem Analysis. Kepner and Tregoe (1981, page 34) define a problem as " ... any situation in which an unacceptable level of performance is not being achieved and the cause of the unacceptable performance is unknown." The purpose of problem analysis is to determine the cause of the unacceptable performance and remedy it. For example, assume that a system which has previously been operating satisfactorily is now malfunctioning, for reasons that are not immediately obvious. According to the authors, the five steps for systematic analysis of this type of problem should be:

1. State the problem (malfunction) as a deviation between what IS happening and what SHOULD be happening. How does the present product or performance differ from the expected?

2. Describe the precise nature of the deviation in four dimensions: identity, location, timing, and magnitude. For each dimension, increase the precision of the description by providing a description of both where the deviation IS occurring and a "closest logical comparison" where the deviation COULD BE occurring, but IS NOT. Kepner-Tregoe (1981, page 43) underline the critical importance of this step as follows: "Regardless of the content of a problem, nothing is more conducive to sound analysis than some relevant basis of comparison." Questions relevant to the four dimensions include the following:
   (a) Identity. What are we trying to explain? What parts of the system and/or product and/or performance are and are not affected?
   (b) Location. Exactly where is the discrepancy located (geographically and physically)? What comparable locations do NOT exhibit the discrepancy?
   (c) Timing. Exactly when did the discrepancy first occur? What is the most recent time previous to the first occurrence that the discrepancy was NOT present? When has the discrepancy occurred and NOT occurred since the first observation?
   (d) Magnitude. What is the extent and importance of the discrepancy? Has or has NOT the discrepancy remained of constant size or importance?

3. Extract the key information from the four dimensions of the problem, paying particular attention to the IS / IS NOT comparisons. It is useful to:
   (a) determine which (comparisons) make meaningful distinctions.
   (b) determine what other system changes just before the malfunction.
   (c) use all related information to generate possible malfunction causes.
   (d) list all possible causes -- even those that may appear superficially unlikely.

4. Logically test each cause against all related evidence; eliminate as many potential causes as possible in this way; identify the most likely cause(s), and devise a "fix".

5. Verify the cause by demonstrating that the fix in fact removes the malfunction. (If it does not, repeat 4 & 5 using the next most probable cause.)

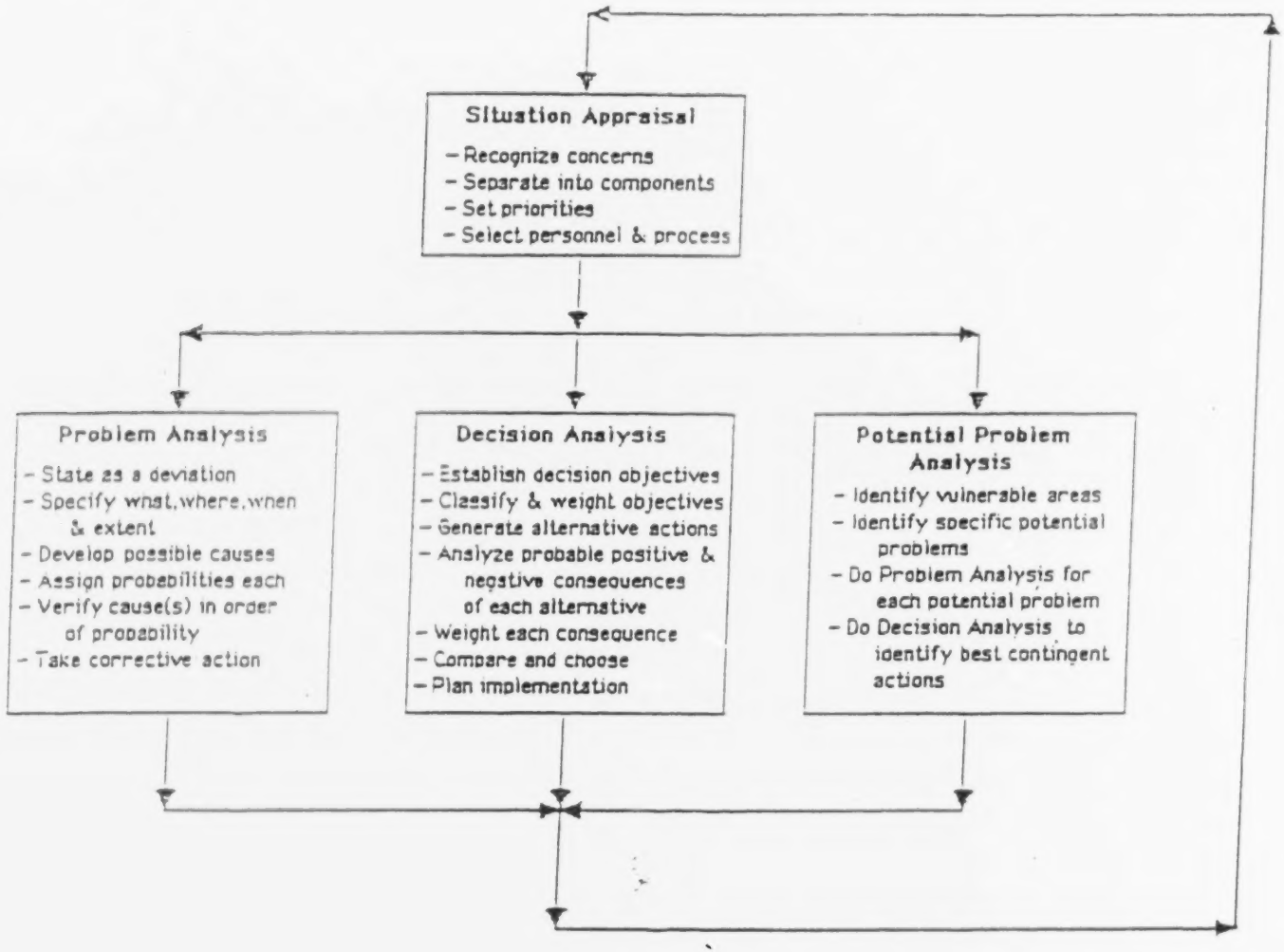
Situation Appraisal
- Recognize concerns
- Separate into components
- Set priorities
- Select personnel & process
Problem Analysis
- State as a deviation
- Specify what, where, when & extent
- Develop possible causes
- Assign probabilities each
- Verify cause(s) in order of probability
- Take corrective action
Decision Analysis
- Establish decision objectives
- Classify & weight objectives
- Generate alternative actions
- Analyze probable positive & negative consequences of each alternative
- Weight each consequence
- Compare and choose
- Plan implementation
Potential Problem Analysis
- Identify vulnerable areas
- Identify specific potential problems
- Do Problem Analysis for each potential problem
- Do Decision Analysis to identify best contingent actions

Figure 2. Diagrammatic Summary of Kepner-Tregoe Rational Management Process

Kepner and Tregoe distinguish two types of problems: (1) a current deviation from formerly acceptable performance, and (2) a performance that has never reached acceptable standards. They provide extensive documentation about the effectiveness of the above procedure for type one problems. However, despite the fact that they say (page 38) that the procedure can be used with both types of problems, there is no example of a type 2 use. This is particularly unfortunate, since one would intuitively expect some differences between the two; e.g., one reason for a type 2 problem could be an inappropriately specified (impossible-to-attain) performance standard. I shall have more to say about type 2 problems later.

The authors do recognize that a focus on human performance requires some modification of the procedure; the entire eighth chapter is devoted to a discussion of these issues. For our purposes, it is sufficient to indicate that most of the modifications amount to changes in wording such as "Who are we concerned about?" rather than "What are we concerned about?" Again, type 2 problems involving human performance pose some special difficulties to be discussed later.

5.4.2 Decision Analysis. The Kepner-Tregoe Decision Analysis system consists of six steps. We shall first list the steps as if strong evaluative evidence were available for each step, then suggest modifications for dealing with uncertainty.

1. State the choice to be made in a decision statement that describes some kind of action and its intended result. It should answer the questions: "Why?", "How?", and "To what end?".

2. Explicitly state the objectives of the decision in two groups: must and wants; then assess the relative importance of objectives.
   (a) MUSTS. These are the objectives which must be met by any decision alternative. They are mandatory for successful performance.
   (b) WANTS. These are objectives which are desirable but not essential. Meeting these objectives will enhance performance, but failure to meet them will not lead to unsuccessful performance.
   (c) Weight WANTS. After all the objectives have been identified, a weight [1 to 10 rating] should be attached to each WANT objective that reflects its relative importance in overall performance.

3. Generate decision alternatives, then assess the degree to each alternative meets the objectives. The steps in assessing an alternative are:
   (a) Check off each MUST objectives that are met by each decision alternative. If any MUST objective is NOT met, the alternative is immediately dropped from consideration.
   (b) Check off the WANT objectives that are satisfied by each competing alternative.
   (c) For each alternative, calculate the sum of the weights attached to the satisfied WANT objectives. These sums represent the overall desirability of each alternative.

4. Generate, for each of the competing alternatives a list of possible adverse (negative) consequences that might result from choosing that action. For each potential adverse consequence we should also attempt to identify a method of preventing, controlling or limiting the potential negative effects. In generating adverse consequences, we should consider at least the following questions. If we choose this alternative:
   (a) What requirements for success have we missed in the previous stages of this analysis?

(b) What factors within the organization, based on our experience, could harm its acceptance or its implementation?
(c) What kind of changes within the organization could harm its long range success?
(d) What kinds of external changes could harm its long range success?
(e) What kinds of things tend to cause problems in implementing this type of decision?

5. Rate (on a 1 to 10 scale) each potential adversity in terms of both its probability of occurrence and its seriousness. The final result is balanced against the desirability scores from step 3 in deciding among alternatives. In general, we would choose the decision with the highest desirability score and the lowest adverse consequence score.

6. Kepner and Tregoe suggest that it is a good idea to perform a full blown Potential Problem Analysis (see the next section) on the chosen alternative prior to actually implementing it.

Dealing With Uncertainty. In many situations we can not obtain highly dependable information about attainment of objectives and/or adverse consequences. In these cases Kepner and Tregoe recommend creating both an effectiveness rating and a probability of occurrence rating for each positive consequence as well as the negative ones. However they recommend against multiplying the probability and effectiveness ratings to obtain overall ratings. In their experience it has been more helpful to use the separate ratings only as additional input to be considered in an overall judgment. The authors provide case studies for both simple and complex decisions involving both definitive and probabilistic performance data.

5.4.3 Potential Problem Analysis. Although Potential Problem Analysis (Kepner and Tregoe, 1981, chapter 6) is similar to the adverse consequences portion of Decision Analysis, it differs in both scope and intent. The main aim here is to prevent or minimize future negative consequences of a current operation rather than to assist in the choice among alternatives. The distinction is underlined by the fact that many executives require every decision recommendation to be accompanied by both a Decision Analysis and a one page Potential Problem Analysis that identifies possible problems associated with implementing the decision and recommends preventative actions and contingency plans (in case the preventative measures do not work). The authors identify four main activities in Potential Problem Analysis, and provide extensive examples showing how each may be accomplished. Since the sub-activities are similar to those listed for similar activities in the other analytic procedures, only the main activities need be listed here.

1. Identification of vulnerable areas in an undertaking, project, operation, event, or plan.
2. Identification of specific potential problems.
3. Identification of the likely causes of problems and possible actions to prevent them from occurring.
4. Identification of contingent actions that can be taken if preventative action fails.

5.4.4 Situation Appraisal. Kepner and Tregoe (1981, Chapter 7) conceive of Situation Analysis as an ongoing evaluation process as opposed to the three analytic processes discussed previously. As indicated by the arrows in figure 2, page 15, it serves both to assess the effectiveness of previous actions and to identify needed new analyses. The rational procedures in Situation Analysis enables a manager to increase his or her competence in four areas: recognizing concerns, separating concerns into manageable components, setting priorities, and planning resolution of concerns. Each of these activities involve complex processes which are only suggested by the lists of specific activities below.

1. *Recognizing Concerns.* The recognition of concerns involves a continuous monitoring of events in both the internal system and its (external) environment. Concerns derive from patterns of events or trends which suggest a need for system-wide action. Specific activities include:
   (a) A continuing search for improvement.
   (b) Looking ahead for possible surprises.
   (c) Reviewing overall progress against goals.
   (d) Listing recent deviations, threats, and opportunities; searching for patterns.
   (e) Continuous monitoring and evaluation of current system operations.

2. *Separating Concerns Into Manageable Components.* The following questions will provide a beginning point for discussions aimed at identifying separate components.
   (a) What additional things happening here?
   (b) What do we see (hear, feel, smell, taste) that tells us we must take actions?
   (c) Are we talking about one thing or several things or one thing.
   (d) Will one action resolve this concern or will it take several?

3. *Setting Priorities Among Concerns.* This step should not be attempted until after complex concerns have been separated into component parts. The first step in setting priorities is to rate each concern on a 1 to 10 scale with respect to each of the following:
   (a) How serious is the impact of the concern on productivity, resources, and personnel?
   (b) How much time urgency does it have?
   (c) What is the best estimate of its probable growth?

   If the number of concerns is fairly large, we must next set aside for future consideration all concerns that rank low on all three of the above dimensions. Once the list has been reduced to say five critical concerns, we can order them on the basis of their seriousness, urgency and growth ratings.

4. *Planning Resolution of Concerns.* The prioritized concerns are dealt with in order of priority. In general, this step involves the identification of the kind of analysis used. Selecting concerns in order of priority we then choose the correct analytic technique or techniques on the basis of the kind of answer that is required.

5.4.5 Summary and Critique. The Kepner-Tregoe model offers a useful framework from which to develop a general-purpose executive strategy for solving problems in educational leadership positions. However, to meet the special requirements of the proposed administration training system, the model need to add mechanisms to deal with: (1) the discontinuous nature of

real-world problem solving, (2) problem "causes" that are probabilistic rather than deterministic, and (3) the unique characteristics of type 2 problems in education.

Discontinuous Problem Processing. The Kepner-Tregoe model implicitly suggests that each of the analytic processes is an intact activity that should be be completed before moving on to the next problem. In the practical world, however, this will seldom be possible. For example, analyses will frequently need to be suspended for several days, or even weeks, while additional information is gathered. In such a situation, efficient managers would record the current status of the analysis, arrange for the problem to be reconsidered in a timely manner as soon as the required information is obtained, then go on to the next problem. The proposed training system should ensure that at least some discontinuous problems are encountered, and the executive strategy taught should handle discontinuity efficiently.

Probabilistic Causes. When dealing with human systems, it will frequently be the case that different "causes" of a problem are suggested by competing theories having comparable plausibility and similar amounts of supporting research evidence. In this situation, it would seem reasonable to conduct a problem diagnosis and develop an action plan (remediation or intervention program) separately for each of the competing theories, then conduct a formal decision analysis to decide among the competing alternatives. (Helpful procedures for identifying causal links and developing remediation programs are presented in the discussion of type 2 problems in the next section.) In the case of close decisions or ties, it would normally be desirable to either obtain additional (extant) research evidence or operate the competing programs on an experimental basis and evaluate the results. The ADMIN-SIM training strategy should encourage and facilitate both kinds of activities.

Type 2 Problems in Education. A large proportion of the most troubling problems in education are of type 2: situations in which highly desirable goals ("shoulds" in Kepner-Tregoe terms) have never been satisfactorily achieved. These situations could be due to any one of the following reasons, or a combination of reasons.

1. *Inadequate Input*. The "raw materials" do not meet the minimum requirements.

2. *Inadequate Theory*. The theoretical principles on which the system operates are incorrect or inadequate.

3. *Inadequate Engineering*. There is a system "bug" and/or a flaw in the application of theoretical knowledge; the system design does not faithfully mirror the relevant theoretical principles.

4. Overambitious Goal Specification. The specified level of performance cannot be produced with the current level of knowledge.

Most of the problems encountered by Kepner and Tregoe concerned unsatisfactory operation of large industrial production systems. In these quasi-mechanical systems, the underlying theory is relatively well-developed, and goals are therefore almost always realistic and achievable. Unsatisfactory performance is therefore almost always due to defects in either raw materials or engineering. In systems dealing with human performance, on the other hand, the theory is not nearly so well developed, and errors due to multiple combinations of the four causes become much more likely. Problems of this sort can be diagnosed using a procedure developed by Collet(1987) for the formative evaluation of instructional programs.

The "problem" addressed by an instructional system can be represented as the discrepancy between the observed state of knowledge of incoming subjects, and the desired state of knowledge at output (completion of the program). Collet diagnoses the potential effectiveness of an instructional system by mapping out its conceptual structure. This is done in four steps:

1. The sequence of intermediate (enabling) learning steps required to move the least able subject from his/her input state to the desired output state is specified. What must be learned? In what order? How long, in our experience, will each learning step take for the least able subject to accomplish?

   If the estimated learning time for any learning step is equal to or greater than the time frame for the evaluation, then the step should be broken down into still smaller steps.

2. The instructional program (intervention) is analyzed to determine whether each of the individual learning steps from (1), above, is explicitly taught by the program. For each learning step, determine:
   (a) What program component or components will teach that knowledge or skill? and
   (b) What theoretical or empirical evidence suggests that (the component) should be successful?

3. The sequence of learning steps is compared to the corresponding sequence of instructional activities to identify missing components (if any), and determine whether the instructional components are in the appropriate order.

4. Inadequacies are corrected by one or more of the following: adjusting incoming requirements, adding or modifying components, changing the order of presentation, and/or adjusting the desired goal (i.e., the output characteristics).

6.0 Training Reforms Suggested by the National Commission

The major impetus for reform in educational administration, and some of the most provocative ideas, come from the report of the National Commission on Excellence in Educational Administration (Griffiths, Stout & Forsyth (Eds.), 1988) Since that report is widely available, only the key concepts will be reported here. However, the description provided here is paraphrased from Griffiths (1988) rather than from the original report because of his useful interpretive comments.

6.1 Focus on Site Management. At the outset, the Commission developed a concept of the role of the administrator that heavily influenced both the developmental process and the resultant recommendations. The committee's concept was succinctly summarized by Griffiths (1988, p.11) as follows:

> The Commission was deeply concerned with what it called "a vision of school leadership." It accepted the concept of school site management as the keystone in the restructuring of schools and as the basis for its concept of administration. . . . The Commission's version of site management is that the principal, teachers, community members, and students would have the authority to jointly prepare the budget, select the materials, hire, promote, and retain staff,buy the services of central office consultants, and develop programs. This, the commission believes, would lead schools to become learning communities, foster collegiality, individualize instruction, and encourage involvement. It would shift resources, both material and human, from central administration to the individual schools where improved learning takes place. All this means a very different and more demanding role for the principal.

Note: An important consequence of the the focus on site management is that principals and superintendents now need essentially the same set of skills.

6.2 Recommended Program Content. The Commission recommended that training programs for all administrators should consist five strands or themes (Griffiths pp. 15-19):

> *Strand 1. The Theoretical Study of Educational Administration.* Course work in administrative theory should include the study of subjects like sociology, psychology, economics, social systems, contingency theory, Barnard-Simon equilibrium theory,and new metaphors for thinking about organizations such as paradigm diversity theory (Burrell & Morgan, 1980). It should also give attention to emerging social issues such as poverty and society, children with aids, and the changing nature of American Society.
>
> *Strand 2. The Technical Core of Educational Administration.* Most current programs have one or more courses in each aspect of the core area (e.g., school law). Griffiths (p. 16) believes that it would make more sense to have a single year-long core course with components such as: supervision of instruction, curriculum building, finance, law, personnel, school-community relations, pupil personnel physical facilities,business management, and evaluation of programs and personnel. Finally, because both superintendents and principals must be consummate politicians and negotiators, each student should have at least one course in this politics and one in negotiation.
>
> *Strand 3. Solution of Problems Using Applied Research and Decision-Making Skills.* This strand should be taught in both the university and in schools. Students should be taught how to solve practical problems through the use of both quantitative and qualitative research methods as well as decision-making techniques. It is recommended that each educational administration department establish an administrative skills center in which students could be tested for these skills. Griffiths (p. 17) believed this was a critical area: "Probably more school administrators fail because of poor skills (in this area) than any other single reason, yet programs and faculty in educational administration fail to do anything about it."

Strand 4. Involvement in Supervised Practice. The student should start clinical experience almost from the first day of graduate study. They would develop a feeling for administration through these experiences and build a rich and varied background that would help them solve problems later in their career.

Strand 5. The Demonstration of Competence. Instead of the traditional research thesis or dissertation, the culminating set of experiences in the recommended program would be a demonstration that the student has really learned something about performing as an administrator. This could involve solving practical problems in a large simulation combined with an actual field study conducted by individual or group of individuals.

Griffiths (1988, pp. 18-24) concludes his article with a number of recommendations for enhancing the vitality and intellectual climate of departments of educational administration. Those most relevant for this discussion are paraphrased below.

-- Unlike engineering research, which is often focused on the problems of practicing engineers, the research done by scholars in educational administration has followed the methods and organization of sociology. Like the sociologist, the researchers in educational administration have chosen to study schools and administration as they exist . . . (rather than examining the) possibilities consequences of professional intervention. (There is a clear implication that research in educational administration ought to be more like that in engineering.)

-- The constraints of time and restricted information have been dissolved by technological advance. This will require that professors rethink their primary responsibilities in teaching, research and service (dissemination). Public schools and departments of educational administration should establish computer networks to exchange knowledge, problems, and information.

-- We should stop our silly arguments as to whether we should be positivists or critical theorists or whatever. We need to understand organizations in many ways, they must be viewed from many vantage points. When viewed from a single set of assumptions, much of the organization is not accounted for. Our thinking should not be monochromatic, but rather like a "coat of many colors" encompassing varied assumptions, analogies, metaphors, and theories (Jelinek, Smircich, & Hirsch, 1983, p. 131).

(Note that the thrust here is the same as in the "paradigm diversity theory" recommended for strand 1 content. I agree with the sentiment, but both the term diversity and the color analogy suggest an acritical eclecticism rather than reasoned assimilation. I prefer the notion of "triangulation of evidence", which suggests a synergistic synthesis; in addition, the term synergistic suggests that the explanation forged by synthesis is frequently more complete and coherent than the combined explanations of the separate approaches.)

7.0 Barriers To Reform.

In my view, the most critical element in the Commission report is the recommendation that both faculty research and student projects (in our case, dissertations) focus on finding solutions to important practical problems. This shift in emphasis might prove difficult. Four potential barriers to the proposed reforms are particularly relevant to this discussion: (1) practical problem-solving is

not viewed as legitimate research, (2) skills taught in the classroom are not generally applied in practice, (3) appropriate field problems are not available for skill practice, and (4) there is a pervasive trend to part-time enrollments.

7.1 Problem-Solving Is Not Viewed As Legitimate Research. Most faculty members, including those in educational administration, were trained in the traditional social-science view of research. From this perspective, the problem-solving activities recommended by the commission look like service rather than legitimate research. Nor do problem-solving activities become any more respectable if we follow the advice of Miskel (1989) and Griffiths (1988) to adopt a wider research perspective that includes emerging qualitative paradigms such as anthropology, ecology, phenomenology, and the like. To understand why, we must examine the traditional social-science view of research. This perspective is well explicated in the following excerpt from Kerlinger (1979, pp. 29-30):

> To understand what a problem in scientific behavioral research is, we will first be negative. We consider problems that are really not problems in the scientific sense. They can be called value or engineering problems. Here are examples: How can integration best be achieved? . . . How can we improve the lot of the urban poor? . . .
>
> How can integration be achieved? is an engineering problem. The questioner wants to know how to do something. . . . (Research) cannot answer them because their form and substance is such such as not to be testable: they neither state nor imply relations between variables. They ask, rather, how to do things. . . .

It should be obvious that most of the practical problems in education are what Kerlinger calls engineering problems. Faculty trained in the Kerlinger view (which includes most of us) have trouble perceiving these as "respectable" (i.e., publishable) research. All of these approaches are concerned with documenting an existing situation rather than developing a way to change it.

In the previous sections it is argued that finding solutions for important educational problems is the most important kind of research an educator can do. Our problem, then is to convince both our educational administration and non-education colleagues that such research is both important and rigorous. To accomplish this, I advocate two parallel actions: First, we should should build a rigorous evaluation of the effectiveness of our problem solutions into every research project; this would enhance their face validity since product evaluations have long been considered a form of research. Second, we should vigorously pursue the development and evaluation of systematic and comprehensive problem-solving paradigms. The Kepner-Tregoe model reviewed earlier provides a promising beginning for this effort.

7.2 Skills Taught In Class Are Not Applied In Practice. Inherent in all teaching is the assumption that the concepts, principles, and strategies taught in the classroom can and will be used students to solve real-world problems outside the classroom. Implicitly, this transfer from classroom learning to the field is assumed to occur automatically, i.e., without specific teacher intervention. However, the research evidence indicates that this assumption is invalid; the expected transfer almost never occurs automatically.

7.2.1 Skill Transfer From LOGO Use. Studies of the effect of the LOGO computer language on child learning provide a striking example. Seymour Papert (1980) was able to demonstrate that primary-grade children could use the "turtle graphics" in LOGO to learn rather complicated geometric ideas such as: you can make a triangle with a string of commands such as "FORWARD 100, RIGHT 60, FORWARD 100, RIGHT 60, FORWARD 100." Papert (1980, chapter 3) considered Turtle Geometry a "mathematics made for learning." He presented a convincing argument that young children who were given the opportunity for extensive experience with LOGO would painlessly learn the complex geometric concepts contained in the program, and that these concepts would translate into better performance in mathematics in general and geometry in particular. During the next five years, many schools were persuaded by the power of Papert's argument to adopt a LOGO-based curriculum. Unfortunately, the expected increase in performance regular geometry and mathematics did not occur.

7.2.2 Theoretical Explanation of Failure to Transfer. Perkins (1985) offers a theoretical explanation for the students' failure to transfer LOGO skills. He says there are two levels at which concepts learned in a technology may be transferred to situations dissimilar tasks. He labelled these first order and second order (transfer) effects. First order effects occur as a direct result of the widespread use of a technology for *unanticipated* as well as designed purposes. Second order effects, on the other hand, occur when the use of a technology *changes* the way we *think* about the targeted activities or problems. Second order effects frequently result in rather fundamental changes in the basic activities, habits and aspirations of a population. The advent of the automobile provides an excellent illustration. The first order effect of automobiles was to improve the speed and comfort of travel, and thus to increase both the frequency of travel and the distances travelled. The second order effects gave rise to traffic jams, pervasive parking lots, backseat romance, and the exodus of city populations to suburbia.

According to Perkins, the history of events following the invention of the printing press suggests the potential impact of information technology. Clearly, the technology of print produced radical and pervasive changes in society. For the first time, information about a variety of subject matters was at our fingertips. This enabled not only first order effects such as the rapid spread of "recipes" for performing practical tasks, but also produced explosive second-order effects by

facilitating the synergistic combination of ideas from disparate cultures and disciplinary fields. Lord (1974) provides a masterly discussion of the limitations of the oral tradition, with its dependence on short-term memory, and the consequent enormous contribution of writing to complex combinatorial thinking.

Perkins demonstrates that two types of second order transfer do occur. Solomon and Perkins (1984) labelled these low road and high road transfer respectively. Low road transfer has been demonstrated to occur when subjects receive massive amounts of practice using a technology to solve a variety of problems in a number of different settings and conditions (Clements & Gullo, 1984; Luria, 1976; Watt, 1979). In low road transfer, time on task and variety of settings are the major predictor variables.

High road transfer has been demonstrated to occur when the principles to be generalized are explicitly identified, and the subject is given specific instruction in adapting the principles to several different problems in a variety of settings (Schoenfeld, 1979; Salomon & Perkins, 1984). In high road transfer, the major variable is the amount of explicit teaching for transfer of programmatic principles.

The reason LOGO experience did not transfer to regular geometry or mathematics, says Perkins (1985), is that the experience was not massive, extensive, and varied enough to produce low road transfer, and high road transfer did not occur because there was not specific instruction in adapting LOGO concepts to general geometry and mathematics. In summary, Perkins presents a compelling argument for providing both extensive experience and explicit teaching to encourage simultaneous low and high road transfer.

Attribution theory (Weiner, 1986) suggests an important mediating variable which helps explain the effectiveness of explicit teaching for transfer in high road transfer. According to this theory, effort and time on task are heavily influenced by the subject's perception of the causes of success and failure in a given activity. If failure is attributed to the amount of effort expended, then the subject is in control of his fate; he/she can change a failure to success by increasing effort. He or she will have a very high sense of efficacy -- a feeling of confidence in his/her ability to control his/her own fate. Subjects with a high sense of efficacy will be motivated to spend the high amounts of time on task required for second order transfer.

On the other hand, the attribution of the cause of success or failure to external factors (luck, the e mysteries of the computer, or the acts of powerful others) means that it is beyond control; nothing the subject does or fails to do will influence the outcome. It produces a very low sense of efficacy; there will be little or no motivation to spend sufficient amounts of time on task. A similar outcome occurs when success or failure is attributed to ability, which is an internal variable, but still beyond the capacity of the subject to change.

7.2.3 Implications of Transfer Research. The implications of the transfer of training research for administrator training are clear: if we expect problem solving and research strategies to be used to solve practical problems, we must provide specific instruction in adapting the concepts to a various problem conditions, and extensive supervised practice in applying the strategies in actual field conditions.

7.3 Appropriate Field Problems Are Not Available For Skill Practice. If we must provide supervised practice in in field settings, it becomes very important to have timely access to appropriate field problems. But, it has typically been very difficult for an instructor in a research methods class to locate field problems appropriate for practice that occurred when and where they needed them.

7.3.1 Bringing Problems to Class: Case Studies and Simulations. Case studies and simulations were developed as a way to bring "real life" problems into the classroom. Unlike actual field practice, these can be scheduled by the instructor, thus enabling him or her to maintain a coherent, developmental presentation of course content.

Case study methods have enjoyed a long and successful association with legal education and are well established in educational administrative training as well. They have undoubtedly helped students to understand the complex interrelationships between a problem and its contextual setting. However, because they feature post-hoc analysis of events that have already occurred, case studies do not allow the learner to operate on the problem or manipulate variables. For this one needs an "unfinished" case which the learner has to resolve; we label such activities "simulations."

Simulations in effect present a wide variety of "unfinished cases" which participants must resolve in some manner. For example, in-basket and case simulations have been long used in business, law, clinical psychology, emergency medicine, foreign service, architecture, transportation, air pollution control, international relations, urban renewal, communications, bank management and police work (Bolton, 1971; Kemerer and Wahlstrom, 1984; Williams, 1985; Suler, 1986; Shulman, 1987).

7.3.2 Optimal Use of Simulations. The widespread use of these exercises in such diverse disciplines and settings suggests a pervasive belief that they help connect theoretical concepts and practical experience. However, extensive personal experience and a respectable amount of empirical evidence (Collet & Shiffler, 1985; Collet, 1986) suggest that both practice with simulations and supervised practice in applying concepts in actual field situations are necessary, a finding is supported by the transfer of training evidence reviewed earlier. Programs to train

administrators to solve practical problems ought to provide extensive practice in the field. But, they should also use simulated problems as a bridge between the classroom and the field.

7.4 Trend to Part-Time Students.. There is a well-established and growing national trend in to part-time students. Griffith (1988, p. 13) illustrates the phenomenon as follows:

> "Although it is recognized that an extremely high percentage (as high as 95%) of all graduate students in educational administration are part-timers, it is also recognized that this is one of the major reasons for the many problems which afflict programs. Courses are not sequential, students do not develop an esprit de corps , do not use libraries, computer facilities,and they do not have the opportunity to participate in field research projects. In short, they do not really experience the benefits and strength of a full-time program.

The Commission report, Griffiths (1988), and Miskel (1989) argue that the study of educational administration should be a full-time endeavor, and that we must find financial and other incentives to reverse the trend and attract the best and the brightest as full-time students into educational administration. While this may be a desirable goal, I suspect the required changes are structural, and will take years to accomplish. Given the competition for the best and the brightest, it may prove to be unachievable. Meanwhile, our educational troubles are immediate, urgent, and growing exponentially. We need provide more effective leadership without waiting for massive new resources. I believe we should take Griffiths' (1988, p. 13) second alternative, and develop programs of study for part-timers that will guarantee them the benefits that accrue from full time study.

7.4.1 Possible Advantages of Part-Time. There is some evidence that it may be easier to integrate instruction and in part-time programs. Miskel (1989) found in-service programs that meaningfully integrated research and instruction but no comparable pre-service programs. Miskel expressed surprise that there were no "core pre-service" programs that integrated research and training in a meaningful way, and wondered, "Is it possible that educational administration departments are willing to focus on research in somewhat peripheral, short-term programs, but not in their core pre-service programs for preparing practitioners? Given the instrumental orientations of students in pre-service programs and lack of research orientation of professors, it might be too risky to place research and theory as the organizing theme in the primary preparation programs of universities." (pp. 8-9).

It seems to me, however, that there is an alternate, more compelling, explanation. I believe that in-service programs facilitate the integration of problem-solving research with training for two reasons: First, students who are working encounter practical problems on a daily basis, and bring the experiences to class. Their experience creates a need for the research and problem-solving

skills, and that predisposes them to learn. Second, they have the advantage of immediate access to problems that can be used to practice the skills they have learned. Part-time students who hold jobs that expose them to administrative problems would have the same advantages as students in the in-service programs; part-time status would be an advantage in a program that focused on practical problem solving.

8.0 A Proposed Solution: Problem-Centered Instruction

In many materials reviewed in the previous sections it was recommended that research in educational administration ought to focus on the collaborative solution of practical field problems. This suggests a mechanism for providing a high-quality Ed.D. training program to part-time students. The key ideas are:

1. Recruit students in a cohort group that will proceed through training as a unit.
2. Involve the group in continuing collaborative research, development, and evaluation effort aimed at solving a thematic field problem of both local and national significance.
3. Focus instruction in each subject area (e.g., school law) on the implications of that content for the thematic problem. Skill subjects (e.g., decision-making, research methods, etc.) will provide concrete demonstrations and practice exercises using content from the thematic problem.
4. Ask each student to take personal responsibility for "solving" a unique sub-set or off-shoot of the thematic problem. They would also be expected to make an explicit statement extending the implications of each course content to their own unique problem.
5. Use computer conferencing for continuing collaborative problem-solving, class discussions of substantive issues, and for written class assignments. Members of a computer discussion can participate without being present at the same time or in the same place.

A training process that possesses all of the characteristics listed above is called Problem-Centered Instruction (PCI). The purpose of this project is to develop and field-test a PCI training program for the Ed.D. in educational administration.

9.0 An Experimental PCI Program for the Ed. D. in Educational Administration

In April 1989, the faculty of the program in Educational Foundations, Policy, and Administration (EFPA) at the University of Michigan field test a model professional Ed. D degree in educational administration that incorporated the PCI principles. The program is intended for aspirants to a professional doctoral degree in educational administration who have demonstrated leadership capacity, and who are currently working in an educational institution in the greater Detroit area. The overriding goal of the program was to produce graduates who are proficient problem solvers capable of exercising responsible autonomy.within a decentralized decision-

making system (i.e., in a site-based management system). Unlike the traditional Ph. D. program, which concentrates on scholarly research to increase academic knowledge, this training sequence emphasize the systematic application of research findings to field problems. A major intent of the PCI procedure is to integrate research and training through problem-centered instruction.

As of this writing, a cohort-group of nineteen has been admitted the experimental program, and it is operating as described in the following section.

9.1 Overview of Program Characteristics. Twelve major characteristics distinguish this program from the traditional doctorate offered at the University of Michigan and comparable institutions. The order of listing is unrelated to the relative importance of the characteristics concerned.

9.1.1 Trains Professional Practitioners. The program is specifically intended to produce competent professional school administrators rather than professors of educational administration or educational researchers.

9.1.2 Part-time Students. The program is designed to deliver high-quality instruction to persons currently employed in schools on a full-time basis. Historically, part-time students have been excluded from the continuing interaction with faculty and other students that is such an important element in the education of full-time students. This program uses cohort grouping and continuing computer-conference discussions to provide a similar experience to part-time students.

9.1.3 Cohort Grouping. Students will be recruited and instructed as a single cohort group. Students and faculty in the program commit themselves to faithfully attend instructional sessions as described in point 4, below. This is intended as an initial configuration which will be continuously monitored and evaluated. Student and faculty suggestions for improvement will be solicited throughout the experimental period. Any desirable modifications during a particular semester will be negotiated among the affected parties on a collaborative basis.

9.1.4 Problem-Centered Instruction. A critically important aim of the program is to improve participants' ability to respond effectively to the problems and needs of their(own) schools; that is, we want to improve their creative problem solving skills. It has been demonstrated that people learn problem solving by actually solving a variety of problems. (See the philosophy section for a more complete discussion of this point.) For this reason, all instructional activities will be centered around attackable thematic problems of important practical interest to the cohorts' schools, and of generic interest to the field of educational administration. The term "attackable" is intended to identify problems which are reasonably likely to be solved or at least moderated by administrative actions.

9.1.5 Thematic Group Problem. To enable problem-centered instruction, a "thematic group problem" will be collaboratively identified early in the first semester, after a substantive discussion of a number of important issues and dilemmas facing American education -- and particularly the Detroit area -- in the next decade. The goal is to find a theme that is important enough to use as a study focus for the entire three-year doctoral program, and broad enough to serve as an umbrella for the specific problem interests of the individual

members of the cohort group. (A possible example might be the school dropout program.) If necessary, two or more related thematic problems will be identified.

9.1.6 Specific Individual Problems. By the end of the first semester, each member of the cohort group is expected to select a specific problem within the thematic area for which s/he will be personally responsible. A significant proportion of instructional time and a majority of homework will be devoted to collaborative and individual problem-solving efforts aimed at the these problems. In general, new concepts and skills will be presented and collaboratively applied and practiced by conducting a series of related projects designed to advance the groups understanding of the thematic group problem. Individuals will then be responsible for extending, adapting, and practicing these procedures in their own specific problem area, and for reporting the results of their studies back to the group. Because of their common tie to the thematic problem, these individual studies can be expected both to further advance the group's understanding of the thematic problem, and to raise issues and questions that might become the subject of new studies by individuals or the group.

9.1.7 School-Improvement Liaison. Wherever possible, the individual projects of cohort members will be closely linked to school improvement efforts in their home school or district that are either being planned or currently underway. School administrators and other personnel involved in improvement projects will be invited to:

(a) participate with faculty and cohort members in a continuing computer-conference discussion of issues, research findings, and intervention ideas related to the thematic problem and/or the individual projects of associated individuals.

(b) host a meeting of the faculty and cohort group at his/her institution at least once per year at which his/her school-improvement project would be presented and discussed.

(c) attend similar meetings hosted by other schools to discuss their school-improvement projects.

9.1.8 Use of Computer Simulations. Computer simulations are a powerful tool for enhancing learning and making it more efficient. We expect to use various simulations over the life of this experimental program, but we can best illustrate the process by describing the proposed use of the ADMIN-SIM program (Collet, 1969). Because this idea is a unusual and somewhat complex, we will describe the program and its potential uses in some detail.

ADMIN-SIM is a computerized "interactive in-basket" simulation that can be used to both teach and test the leadership and management skills of aspiring educational administrators. Participants in the simulation begin with an "in-basket" containing written documents that present typical school problems requiring some administrative action. As the participant works on these decisions, new problems may arrive by interruptive telephone calls or other messages. Problems vary in urgency: some require an immediate response, and others allow considerable time for analysis and planning. The participant may gather additional information about any problem from an on-line database or by addressing questions to appropriate staff members. However, he/she must be careful to act in a timely fashion; failure to act on an urgent problem can trigger a new and far more serious problem. Each problem has a number of built-in consequences contingent on the actions taken by the participant and the time at which the actions are taken. The participant's task is to take the actions that will minimize the bad consequences and maximize the good consequences for the entire set of problems. The problem set is designed so that participants who follow good efficient problem-solving and decision-making practices will be more likely to obtain good consequences than bad. Effective performance in this context refers to behaviors that

display proficiency in the generic school administration skills as measured in the NASSP Assessment centers operated by the Michigan Institute for Educational Management. The skills particularly emphasized by ADMIN-SIM are: problem analysis, organizational ability, sensitivity, educational values, judgment, decisiveness, and written communication. The program provides feedback on participant performance in nine skill areas, and records every action taken so that the performance can be diagnostically reviewed by the instructor.

The ADMIN-SIM program will be used in the proposed experimental training program for three purposes: skill development, laboratory experimentation, and simulation development.

(a) *Skill Development.* Students will use the ADMIN-SIM as a practice exercise to help develop their proficiency in the generic school administration skills. We expect to have three parallel forms of an assessment exercise available early next year. One form would be used for diagnostic pre-testing, the second for skill-development practice, and the third for post-testing.

(b) *Laboratory Experimentation.* Cohort students will use ADMIN-SIM to perform "laboratory experiments" to assess the effects of certain "moderator variables" that were built into the system. Two brief examples using the "character gender" and "decision cues" variables will illustrate the possibilities. (1) Character gender: Since the program permits the gender of simulation characters to be changed at will, students can experimentally assess the nature of gender bias by comparing the communication and decision-making patterns of randomly assigned subjects assigned a simulated problem with mostly males characters versus subjects assigned the same problem with mostly female characters. (2) Decision cues: When the decision cues variable is on, ADMIN-SIM prompts the participant to perform a series of steps that follow a problem-solving, decision-making flowchart adapted from Kepner and Tregoe (1981); when it is off, no prompts are given. This allows students to perform experiments comparing the performance of subjects with and without cues, and/or to assess the carryover effects of cueing. It is expected that students could usually obtain voluntary subjects for these and similar experiments among their school colleagues.

(c) *Simulation Development.* In our experience, there is much more to be learned from designing a simulation than from using one. ADMIN-SIM was specifically designed to make it easy to develop new simulation exercises. Each cohort member, as part of his/her training, will develop a new ADMIN-SIM simulation exercise in his/her individual problem area. The first major advantage of this assignment is that it forces students to develop a concrete "theory" of the mechanisms that drive behaviors in their problem area, and offers at least some opportunity to assess the theory. This should markedly improve their ability to come up with viable interventions. A second major advantage is that of the assignment is that it provides the University faculty (and the field of educational administration) with a continuing source of new simulation problems.

9.1.9 Built-in Dissertations. Part-time students have traditionally had great difficulty coming up with viable dissertation topics and with conducting scholarly research while working full time. The integration of instruction with a continuing investigation of problem(s) of direct interest to the students' employers (and themselves) is intended to provide a built-in dissertation topic, and to spread the scholarly investigation of that topic over the entire training period rather than concentrating it at the end of training. It should be specifically

noticed that the development and rigorous field evaluation of a new ADMIN-SIM problem could in itself become a dissertation.

9.1.10 Blocked Courses. Course work will be delivered in blocks, with all activities centered around a collaborative study of practical school problems with broad significance to the target population. The organizing instructional concepts are presented in sections 5.1 through 5.6. The proposed cohort grouping and blocked-course format are intended to:

(a) facilitate continuous progress at an optimum rate,
(b) minimize the financial burden caused by substantial enrollment fees in the one-course-per-term format common among part-time students.

9.1.11 Curriculum. We began the program planning with four goals in mind: First, we wanted to deliver the program in a total of three years, two years of course work followed by a year for the dissertation. Second, the program had to be comparable to our existing doctoral program with respect to the number of credit-hours in education courses (32), cognate or non-education hours (12), and dissertation credit-hours (8). Third, we wanted as many of courses taught as possible to be taught in the collaborative, problem-solving PCI mode described earlier. Our plan is that all 32 credit-hours in education will be delivered in the PCI mode. Fourth, we wanted to center instruction around a aeries of "focal tasks" that parallel the sequential steps in effective empirical problem-solving and decision-making: (1) identify, analyze, and define the problem, (2) determine the local manifestations of the problem, (3) develop a theoretical explanation (conceptual structure), (4) develop alternative actions or interventions, (5) decide which alternatives to implement, (6) develop plan to empirically evaluate alternatives, (7) collect data regarding effectiveness, (8) analyze effectiveness data, and (9) report results, implications and recommendations.

The credit and problem distribution across the twelve time blocks in the three-year training program are listed below

Fall Semester 1989. Take 6 education credits, apply knowledge to Focal Task # 1: collaboratively identify, analyze, and define the thematic problem, then individually apply the process to unique sub-problems.

Winter Semester 1990. Take 6 education credits, apply knowledge to Focal Task # 2: collaboratively determine the extent and severity of the thematic problem in the local communities, then individually determine the extent and severity of the unique sub-problem.

Spring Semester 1990. Take 4 education credits, apply knowledge to Focal Task # 3: collaboratively develop a conceptual structure (theoretical explanation) for the thematic problem, then individually develop conceptual structures for the unique sub-problems.

Summer Semester 1990. Take 6 credits of cognate (non-education)courses ; No specific focal tasks.

Fall Semester 1990. Take 6 education credits, apply knowledge to Focal Task # 4: collaboratively develop alternative actions or interventions for thematic problem, then individually develop alternatives for unique sub-problems.

Winter Semester 1991. Take 6 education credits, apply knowledge to Focal Task # 5: collaboratively decide which alternatives to implement for thematic problem, then individually decide alternatives for unique sub-problem.

Spring Semester 1991. Take 4 education credits, apply knowledge to Focal Task # 6: collaboratively develop plan to empirically evaluate alternatives for the thematic problem, then individually develop plan to evaluate alternatives for the unique sub-problems.

Summer Semester 1991. Take 6 credits of cognate (non-education)courses ; No specific focal tasks. (Final doctoral Qualification exam scheduled here.)

Fall Semester 1991. Dissertation credits, Focal Task # 7: Collaboratively collect data regarding alternatives effectiveness.

Winter Semester 1991. Dissertation credits, Focal Task # 8: collaboratively analyze effectiveness data for thematic problem, then individually analyze the data for the unique sub-problems.

Spring-Summer 1991. Dissertation Credits, Focal Task #9: Collaboratively write report of analytic results, implications and recommendations.for the thematic problem, then individually write report (dissertation) for the unique sub-problems. (Final oral scheduled here.)

9.1.12 Teaching Process. The curriculum content will typically be team-taught by three professors, one responsible for technical skills, and two professors will deal with the implications of their knowledge specialty (e.g., history, philosophy, psychology, law, curriculum theory, etc.), and the third professor with the technical skills relevant to that particular focal task (step in problem-solving).. Once the group thematic and individual problems have been defined, applied individual practice will focus on the individual's own unique sub-problem.

10.0 Faculty Grounded Research on the PCI Program

It was argued in previous sections that a major advantage of the PCI approach to training was its potential to integrate the instruction and research activities of faculty. That is, faculty research could be focused on problems from their instructional activities in PCI, and both the process of that research and its resulting products could be used for instruction. To promote early realization of this potential, several grounded research projects were built into the program right from the beginning.

The main purpose of this research is to identify instructional principles and sets of principles that will improve an existing instructional process, and be helpful in devising new instructional ones. The term "grounded" is used to suggest this practical orientation. Several such project are in the planning stage, but a brief description of two that are currently being organized will illustrate the potential of the approach.

10.1 Impact of Parens Patria Laws on Schools. Parens patria laws allow the state to intervene between a child and its parents (e.g., child abuse laws). In recent years, these laws have resulted in new non-education roles, responsibilities, and obligations for teachers and principals. There is reason to believe that some of these might fundamentally change important

principals. There is reason to believe that some of these might fundamentally change important instructional relationships. For example, the recent legal requirement, in Michigan, to report all suspected cases of child abuse implies the responsibility to *look for* and *notice* symptoms of child abuse. The well-known experimenter effect suggests that what we look for, we will find. If, as some critics suggest, the law will set us to "spying" on each other, what will happen to the the relationship between teachers and students, between principals and students, and between principals and teachers? All of these are critical for learning. The investigator in this study plans to collaborate with the PCI students in extensive surveys, interviews and participant observation to determine principals and teachers knowledge of these laws, compliance with them, and the effects of various forms or levels of compliance on their relationships with each other and with students.

10.2 Effects of Using a Problem-Solving Protocol. It has been pointed out previously that the problem-solving process required for effective administration is a complex "executive strategy" that at various stages involves methods of grounded research, program development, program evaluation, and decision-making. The investigator in this study plans to develop and field test a comprehensive problem-solving protocol. The protocol would be a kind of flowchart that leads people through the appropriate steps, avoiding common pitfalls and errors. It could be used to teach good problem-solving procedures, and perhaps also as a guide to action during actual field practice. The investigator already has developed a flowchart representation of the Kepner-Tregoe process (adapted to the school situation). During the winter session, its effectiveness will be formally evaluated in a laboratory session in which PCI students "solve" a pair of parallel simulated problems, using the protocol for one problem and not for the other. We expect the protocol to be generally improve performance, but we also expect to find that it has some hidden weaknesses. The overall strategy is to expand and perfect the protocol on the basis of PCI student performance and experience in a series of seven or eight such laboratory sessions. Each laboratory session in this process constitute a formal experimental evaluation of the current model. After each evaluation (session) is completed, the protocol will be adapted and improved using the CSPE procedure developed by Collet(1987). The major steps of the process are briefly summarized below.

The "problem" addressed by an instructional system can be represented as the discrepancy between the observed state of knowledge of incoming subjects, and the desired state of knowledge at output (completion of the program). Collet diagnoses the potential effectiveness of an instructional system by mapping out its conceptual structure. This is done in four steps:

1. The sequence of intermediate (enabling) learning steps required to move the least able subject from his/her input state to the desired output state is specified. What must be

learned? In what order? How long, in our experience, will each learning step take for the least able subject to accomplish?

If the estimated learning time for any learning step is equal to or greater than the time frame for the evaluation, then the step should be broken down into still smaller steps.

2. The instructional program (intervention) is analyzed to determine whether each of the individual learning steps from (1), above, is explicitly taught by the program. For each learning step, determine:
   (a) What program component or components will teach that knowledge or skill? and
   (b) What theoretical or empirical evidence suggests that (the component) should be successful?

3. The sequence of learning steps is compared to the corresponding sequence of instructional activities to identify missing components (if any), and determine whether the instructional components are in the appropriate order.

4. Inadequacies are corrected by one or more of the following: adjusting incoming requirements, adding or modifying components, changing the order of presentation, and/or adjusting the desired goal (i.e., the output characteristics).

10.3 Developing New Research Projects. We are currently organizing an advisory council for the PCI program. The completed council will have representatives from the central office of each school district represented by the students. We plan to use the advisory as a source of additional research projects to be conducted on a collaborative basis by faculty, students and selected personnel from the participating districts.

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